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Solution of Problem 120. (See Vol. III, p. 132.)

Editor Analyst:

As you requested me to examine Prob. 120 under the supposition that it should have been written

$$\text{Given}\left\{\begin{aligned}&[x^2+xy+y^2]^{\frac{1}{x+y}}=m,\\&[x^2-xy+y^2]^{\frac{1}{x-y}}=n,\end{aligned}\right\}\text{To find } x \text{ and } y,$$

I submit the following solution:

Clearing the equations of fractions and multiplying the first by $x-y$ and the second by $x+y$, and reducing, we get

$$(n-m)x^3=(n+m)y^3\,;$$

whence we find

$$x=\left(\frac{n+m}{n-m}\right)^{\frac{1}{3}}.y,\quad y=\left(\frac{n-m}{n+m}\right)^{\frac{1}{3}}.x.$$

Substituting for y and x, respectively, in the first and second eq's, we get

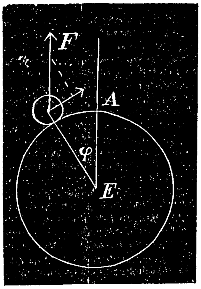
$$x=m.\frac{(n^2-m^2)^{1/3}+(n+m)^{2/3}}{(n+m)^{2/3}+(n^2-m^3)^{1/3}+(n-m)^{2/3}},$$

$$y=m.\frac{(n^2-m^2)^{1/3}+(n-m)^{2/3}}{(n+m)^{2/3}+(n^2-m^3)^{1/3}+(n-m)^{2/3}}.$$

George H. Harvill.

Bonner, La., Jan. 24, 1880.

Prob. 281. (See p. 190, Vol. VI.) Solution by Prof. De Volson Wood.—Assuming that the attraction of the sun is constantly parallel to the line of centres of the earth and sun, and of constant intensity F, then will $F\sin\varphi$ be the force which causes the ball to roll, φ being the angular distance on the earth of the ball from the line of centres. Let θ be the angle through which the ball has rolled when its angular dist. from the line of centres is φ and t the corresponding time, m the mass of the ball, v the present velocity of the earth in its orbit, D the distance between the earth and sun, R the radius of the earth, r the radius of the ball and k its radius of gyration and ω the angular velocity of the earth. Then we have



$$F=m\frac{v^2}{D},\tag{1}$$

$$\frac{d^2\theta}{dt^2}=\frac{Fr\sin\varphi}{mk^2},\tag{2}$$

$$R\omega t=R\varphi+r\theta.\tag{3}$$